

Low-voltage connector intended for use in a communication system

5 The present invention relates to a low-voltage connector designed to be used in a communication system. The invention relates more precisely to a connector of the RJ type, more particularly of the RJ45 type.

Known from document US 7,364,444 is a female RJ45 connector comprising in particular a body, for example made in two portions. The front face of the connector has a housing or recess designed to accommodate a matching male connector. This type of connector also comprises a support for insulation-displacement contacts, each contact accommodating the wire of a cable and a wire-organizing support positioned above the support for the insulation-displacement contacts.

It is known that it is necessary to preserve the integrity of the signals transmitted in communication systems. To maintain the integrity of the signals at a certain level, it is in particular necessary to take account of the crosstalk causing a capacitive and inductive coupling between the signals transmitted on various conductors. A signal transmitted on one conductor is thus capable of interfering with and disrupting a signal transmitted on a conductor situated close by. This phenomenon is all the more accentuated if the conductors are close together. Inside one and the same connector, solutions have been used to counter the phenomena of crosstalk between the conductors. However, since the signals are transmitted at ever increasing bit rates, which may reach as high as several gigabits per second, the crosstalk phenomenon has become accentuated and is no longer limited to the conductors situated inside one and the same connector. Specifically, the crosstalk phenomenon is now propagated between conductors situated in separate adjacent connectors. For example, a signal transmitted at a high bit rate on a conductor of a connector produces electromagnetic disturbance in the signals transported on an adjacent connector. This phenomenon of disturbance between connectors is called "alien crosstalk" or "exogenous crosstalk". US Patent 7,232,340 proposes in particular various solutions to counter the phenomenon of alien crosstalk. Certain solutions proposed in this patent consist in particular in enclosing the insulation-displacement contacts inside a metal screen part that can take various configurations. This screen part is situated outside the contact support and is therefore particularly voluminous. Moreover, it has to comprise an external metal coating and an internal coating made of an insulating

material in order to prevent any short circuit between the length allowances of the wires inside the connector.

Moreover, known from Patent Application US2005/014420 is a connector comprising in particular a guide part designed to guide and to separate the wires upstream of a wire-organizing support mounted on the insulation-displacement contacts. This guide part makes it possible in particular to limit alien crosstalk with respect to external connectors. This connector has the disadvantage that its guide part, which also makes it possible to limit alien crosstalk, is fitted to the outside of the body of the connector and must be positioned at the level of the wires when the connector is connected to the wires.

The object of the invention is to propose a connector making it possible to alleviate the disadvantages of the prior art.

This object is obtained by a low-voltage connector designed to be used in a communication system and comprising:

- a body capable of being connected via its front portion to a matching connector,
- a support mounted inside the body and comprising insulation-displacement contacts to each of which one of the wires contained in a cable can be connected, the said contacts being organized in rows,
- a metal screen part designed to limit the alien crosstalk with respect to adjacent connectors,
- the body of the connector enclosing a cable-wire organizing support which comprises several locations each designed to accommodate one end of a wire of the cable in order for it to be inserted into an insulation-displacement contact, the organizing support being secured to the body and mounted on the insulation-displacement contacts so that at least one location corresponds to an insulation-displacement contact,
- the screen part being positioned between the rows of insulation-displacement contacts and held between the support of the insulation-displacement contacts and the cable-wire organizing support.

According to the invention, the screen part therefore does not take up very much space because it occupies the space that exists between the rows of contacts, for example between the two rows of contacts. The arrangement of the screen part between the rows of contacts makes it possible for the length allowances of the wires

not to come into contact with it. It is therefore not necessary to make a screen part consisting of at least two different materials, including an insulating material.

According to a particular feature of the invention, the screen part is inserted into the body of the connector.

5 According to another particular feature, the support of the insulation-displacement contacts comprises two rows of insulation-displacement contacts made on two parallel planes and between which the screen part is wedged. The screen part is positioned more particularly facing the surface separating the two rows of contacts.

10 According to another particular feature, for each row of contacts, the screen part comprises two symmetrical brackets connected together via a crossmember.

 According to another particular feature, at each end of the crossmember, the bracket is bent at right angles relative to the crossmember.

15 According to another particular feature, for each row of contacts, the crossmember runs alongside the row of contacts and the brackets stand at the ends of the row and each extend on a plane crossing the plane of the row and over a surface area sufficient to mask the contacts in the plane of the row.

 According to another particular features, in the middle of each crossmember, the screen part comprises a central bracket standing parallel to the two end brackets.

20 According to another particular feature, for each row of contacts, the central bracket extends in a plane parallel to the plane of the row of contacts. It makes it possible to balance the geometry of the screen part around each pair of contacts and thus improve its electromagnetic symmetry.

 According to another particular feature, the two crossmembers are connected by at least one strip extending between the two rows of contacts.

25 According to another particular feature, each row of contacts is formed on a portion made of insulating material on which the insulation-displacement contacts stand.

30 According to another particular feature, for each row of contacts, the crossmember of the screen part extends along the portion made of insulating material of the row. In this manner, the insulation-displacement contacts are not in contact with the screen part.

 According to another particular feature, the screen part is symmetrical relative to the plane equidistant from the two crossmembers.

According to another particular feature, the screen part is held on the axis of insertion of the matching connector between the support for the insulation-displacement contacts and the cable-wire organizing support.

Other features and advantages will appear in the following detailed description with reference to an embodiment given as an example and represented by the appended drawings in which:

- Figure 1 represents a first exploded view of the connector of the invention,
- Figure 2 represents a second exploded view of the connector of the invention in which the screen part is assembled to the connector,
- 10 - Figure 3 represents the front portion of the connector of the invention, to which the screen part is assembled,
- Figure 4 represents the screen part used in the invention.

The invention relates to a low-voltage connector designed to be used in a communication system. More precisely, the connector 1 of the invention is of the RJ
15 ("Registered Jack") type, more particularly of the RJ45 type. In a known manner, an RJ45 connector is designed to accommodate four communication lines and comprises two contacts per line. The cable connected to the connector therefore comprises eight distinct wires.

According to the invention, the connector is of the female type. With reference
20 to Figures 1 and 2, the connector comprises a body 1 having a front portion 10 and a rear portion 11. The front portion of the body comprises, on its front face, a housing or recess (not visible in the figures) designed to accommodate, along an axis (X), a matching connector of the male type. Flexible contacts, numbering eight in an RJ45 connector, are provided in the housing. These flexible contacts are capable of
25 deforming elastically when the matching male connector is plugged in in order to establish an electric contact with contacts formed on the matching male connector.

The body 1 also contains a support for insulation-displacement contacts (also called IDCs) and a printed circuit, both mounted on its front portion 10. The support
100 is made of insulating material, for example of plastic. On their support 100, the
30 insulation-displacement contacts 102 are organized in two rows R1, R2 of four contacts 102 made on two parallel planes. In a known manner, each insulation-displacement contact 102 is formed of a pin comprising a slot capable of receiving a wire of a supply cable and of stripping it in order to establish the electric contact. In the figures, the insulation-displacement contacts 102 stand towards the rear of the

connector. The printed circuit has electric tracks connected on the one hand to the insulation-displacement contacts 102 and on the other hand to the flexible contacts situated in the housing of the connector. Certain connectors do not comprise the printed circuit 101, the electric contact between the flexible contacts of the housing and the insulation-displacement contacts 102 then being made directly.

The rear portion 11 of the body 1 comprises a cable-wire organizing support 110 formed of a moulded plastic part forming several pins 111 defining between them several slots each forming a location for receiving a wire of the cable. The support 110 comprises two rows of locations, with one location for each insulation-displacement contact 102. Prior to their connection with the insulation-displacement contacts 102, the wires of the cable are distributed over the organizing support 110, each locked in a slot of the latter. At each of its locations, the support has an orifice designed to be traversed by an insulation-displacement contact 102. The cable-wire organizing support 110 is mounted directly on the insulation-displacement contacts 102 so that each insulation-displacement contact 102 traverses an orifice of a location of the wire-organizing support 110.

The rear portion 11 of the body 1 comprises a part 112 being fitted to the rear of the connector on the wire-organizing support 110 and comprising an aperture 113. On the wire-organizing support 110, the wires are separated and each positioned in a determined manner depending on their function in a location of the support 110. Once positioned, the wire must be pushed into its insulation-displacement contact 102 in order to establish the electric contact. The part 112 is mounted on the support 110 once the wires are connected in order to lock the position thereof. The cable (not shown) is then optionally lifted in order to pass through the aperture 113 in the event of axial exit.

According to the invention, inside the body 1 of the connector, between the rear portion 11 and the front portion 10, the connector comprises a metal screen part 12 designed to limit the phenomenon of alien crosstalk with respect to adjacent connectors. In the axis (X) of the connector, this screen part 12 is held between the support 100 of insulation-displacement contacts 102 and the wire-organizing support 110 and is positioned facing the surface 103 of the support separating the two rows of contacts 102 and more particularly resting against the elements 104 standing on the said surface 103. On the axis perpendicular to the axis (X) of the connector and perpendicular to the rows R1, R2 of contacts 102, the part 12 is wedged between the

two rows of insulation-displacement contacts 102 and more particularly between two insulating portions of the support on which the two rows R1, R2 of contacts are formed.

With reference to Figure 4, the screen part 12 is made in a symmetrical manner relative to two planes of symmetry perpendicular to one another. For each row R1, R2 of contacts 102, the screen part 12 comprises two end brackets 120 symmetrical with respect to one of the planes and connected via a crossmember 121a, 121b. The two crossmembers 121a, 121b are connected together by at least one strip 122, for example two strips, extending facing the surface 103 of the support 100 separating the two rows R1, R2 of contacts. The two brackets 120 stand perpendicularly to their crossmember 121a, 121b and are folded outwards from the part so as to form a right angle with their crossmember 121a, 121b. In the middle of each crossmember 121a, 121b, the screen part 12 comprises a central bracket 123 standing parallel to the two end brackets 120 and equidistant from these two brackets 120. Each central bracket 123 is made in the same plane as its crossmember.

When the screen part 12 is positioned in the body 1 of the connector (Figures 2 and 3), each crossmember 121a, 121b runs along a row R1, R2 of contacts 102, facing the insulating portion of the support 100 on which the row of contacts 102 is made and the two end brackets 120 stand at the two ends of the row, parallel to the contacts 102, over a length sufficient to reach the same level as the ends of the contacts. For each row R1, R2 of contacts, the two end brackets 120 extend on two parallel planes traversing the plane of the row and over a sufficient surface to mask the contacts in the plane of the row relative to the outside. In this manner, the end brackets 120 form a screen between the contacts and the outside. The central bracket 123 is, for its part, positioned between the two pairs of contacts of the row in order to balance the geometry of the screen part 12 about each pair of contacts 102 and to thereby enhance its electromagnetic symmetry. According to the invention, on each row R1, R2 of contacts 102, the structure formed between each end bracket 120 and the central bracket 123 makes it possible to create a zero potential between each pair of contacts 102 and therefore limits the disturbance formed by each pair of contacts 102 towards the outside of the connector.

It is clearly understood that it is possible, without departing from the context of the invention, to conceive of other variants and enhancements of detail and even to envisage using equivalent means.

CLAIMS

1. Low-voltage connector designed to be used in a communication system and comprising:

- 5 - a body (1) capable of being connected via its front portion (10) to a matching connector,
- a support (100) mounted inside the body (1) and comprising insulation-displacement contacts (102) to each of which one of the wires contained in a cable can be connected, the said contacts being organized in rows,
- 10 - a metal screen part (12) designed to limit the alien crosstalk with respect to adjacent connectors,
- the body (1) of the connector enclosing a cable-wire organizing support (110) which comprises several locations each designed to accommodate one end of a wire of the cable in order for it to be inserted into an
- 15 insulation-displacement contact (102), the organizing support (110) being secured to the body (1) and mounted on the insulation-displacement contacts (102) so that at least one location corresponds to an insulation-displacement contact (102),

characterized in that:

- 20 - the screen part (12) is positioned between the rows of insulation-displacement contacts and held between the support of the insulation-displacement contacts (102) and the cable-wire organizing support (110).

2. Connector according to Claim 1, characterized in that the screen part (12) is inserted into the body of the connector.

25 3. Connector according to Claim 1 or 2, characterized in that the support (100) of the insulation-displacement contacts (102) comprises two rows (R1, R2) of insulation-displacement contacts made along two parallel planes and between which the screen part (12) is wedged.

30 4. Connector according to one of Claims 1 to 3, characterized in that, for each row (R1, R2) of contacts, the screen part (12) comprises two symmetrical brackets (120) connected together via a crossmember (121a, 121b).

5. Connector according to Claim 4, characterized in that, at each end of the crossmember (121a, 121b), the bracket (120) is bent at right angles relative to the crossmember (121a, 121b).

5 6. Connector according to Claim 4 or 5, characterized in that, for each row (R1, R2) of contacts, the crossmember (121a, 121b) runs alongside the row of contacts and the brackets (120) stand at the ends of the row and each extend on a plane crossing the plane of the row (R1, R2) and over a surface area sufficient to mask the contacts in the plane of the row.

10 7. Connector according to one of Claims 4 to 6, characterized in that, in the middle of each crossmember (121a, 121b) the screen part (12) comprises a central bracket (123) standing parallel to the two end brackets (120).

8. Connector according to Claim 7, characterized in that, for each row of contacts, the central bracket (123) extends in a plane parallel to the plane of the row of contacts (102).

15 9. Connector according to one of Claims 4 to 8, characterized in that the two crossmembers are connected by at least one strip (122) extending between the two rows (R1, R2) of contacts.

20 10. Connector according to one of Claims 4 to 9, characterized in that each row of contacts is formed on a portion made of insulating material on which the insulation-displacement contacts stand.

11. Connector according to Claim 10, characterized in that, for each row (R1, R2) of contacts, the crossmember (121a, 121b) of the screen part (12) extends along the portion made of insulating material of the row (R1, R2).

25 12. Connector according to one of Claims 4 to 11, characterized in that the screen part (12) is symmetrical relative to the plane equidistant from the two crossmembers.